



North Coast Regional Water Quality Control Board Cyanobacteria Harmful Algal Bloom Monitoring & Response Program



Copco Reservoir



Russian River

What are Harmful Algal Blooms? (HABs)



Photo Credit: KarukTribe

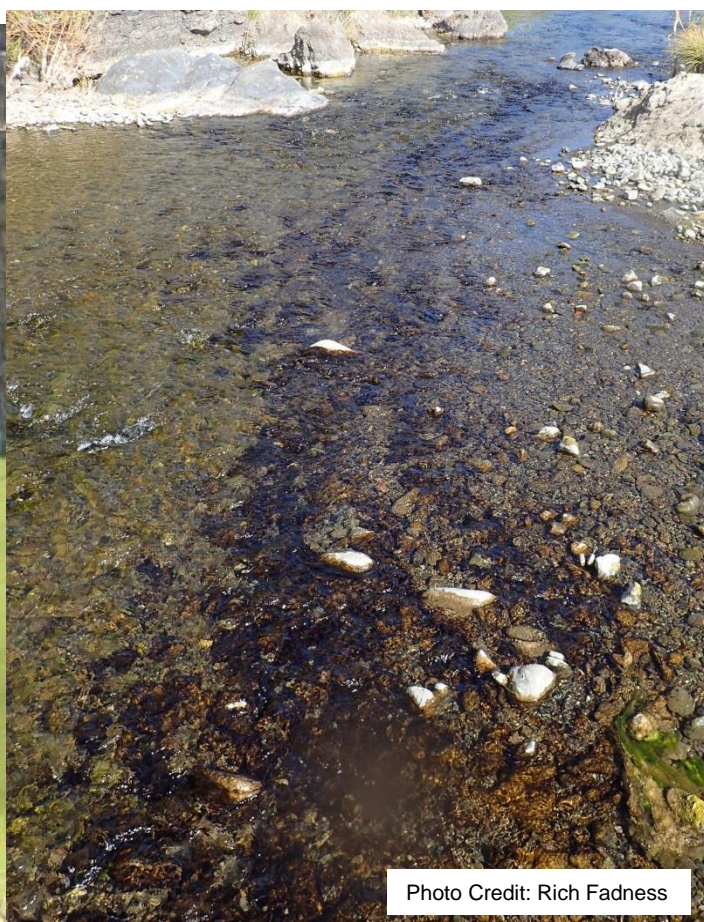


Photo Credit: Rich Fadness



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CyanoHAB Toxins

■ Cyanotoxins

- ✓ Dermatoxins – affect the skin
- ✓ Hepatotoxins – affect the liver
- ✓ Cytotoxins – affect the kidneys
- ✓ Neurotoxins – affect the nervous system

■ Pet and livestock health effects:

- ✓ Diarrhea
- ✓ Vomiting
- ✓ Convulsions
- ✓ Death



■ Humans health effects:

- ✓ Skin rash
- ✓ Eye irritation
- ✓ Diarrhea
- ✓ Vomiting
- ✓ Seizures
- ✓ Paralysis



■ Wildlife effects:

- ✓ Toxins found in fish organs and tissue
- ✓ Accumulation in shellfish
- ✓ Acute poisoning of wildlife



Photo Credit: Miller et al. 2010, PLOS ONE



Harmful Algal Bloom Water Quality Risk Factors

Risk Factors

(Modified from Paerl and Otten, 2013)

- **Climate Change / changing precipitation patterns**
- **Warm water temperatures**
- **Nutrient over-enrichment**
- **High light/solar radiation**
- **High dissolved organic matter**
- **low flow (rivers)**
- **Long residence time (lakes)**
- **Persistent stratification (lakes)**

Co-Factors

(Biostimulatory Conditions)

- **Reduced Riparian Canopy**
- **Channel Morphology**
- **Impoundments**
- **Reduced Flows**
- **Pollutant Loading**
- **Watershed Conditions**

Klamath River

Crescent City

Yreka

Copco Reservoir

Iron Gate Reservoir

Big Lagoon

Trinity River

Van Duzen River

Eureka

Weaverville

South Fork Eel River

Eel River

Laytonville

Lake Pillsbury

Mendocino

Ukiah

Spring Lake

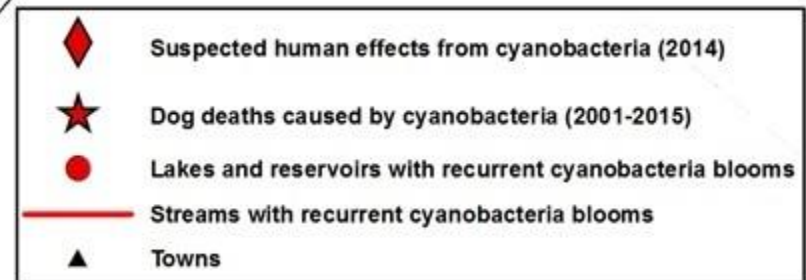
Russian River

Santa Rosa



CyanoHABs

Where do they occur in the North Coast Region?



0 20 40 80 120 Km



Cyanobacteria Harmful Algal Bloom Monitoring & Response Program

Focus on Areas with recurring CyanoHABs

- ✓ **Klamath River & Reservoirs**
- ✓ **Russian River**
- ✓ **Eel River, South Fork Eel River,
& Lake Pillsbury**

Russian River

Cooperative Monitoring Partnership

North Coast RWB – Division of Drinking Water - Sonoma County DHS – Sonoma County Water Agency

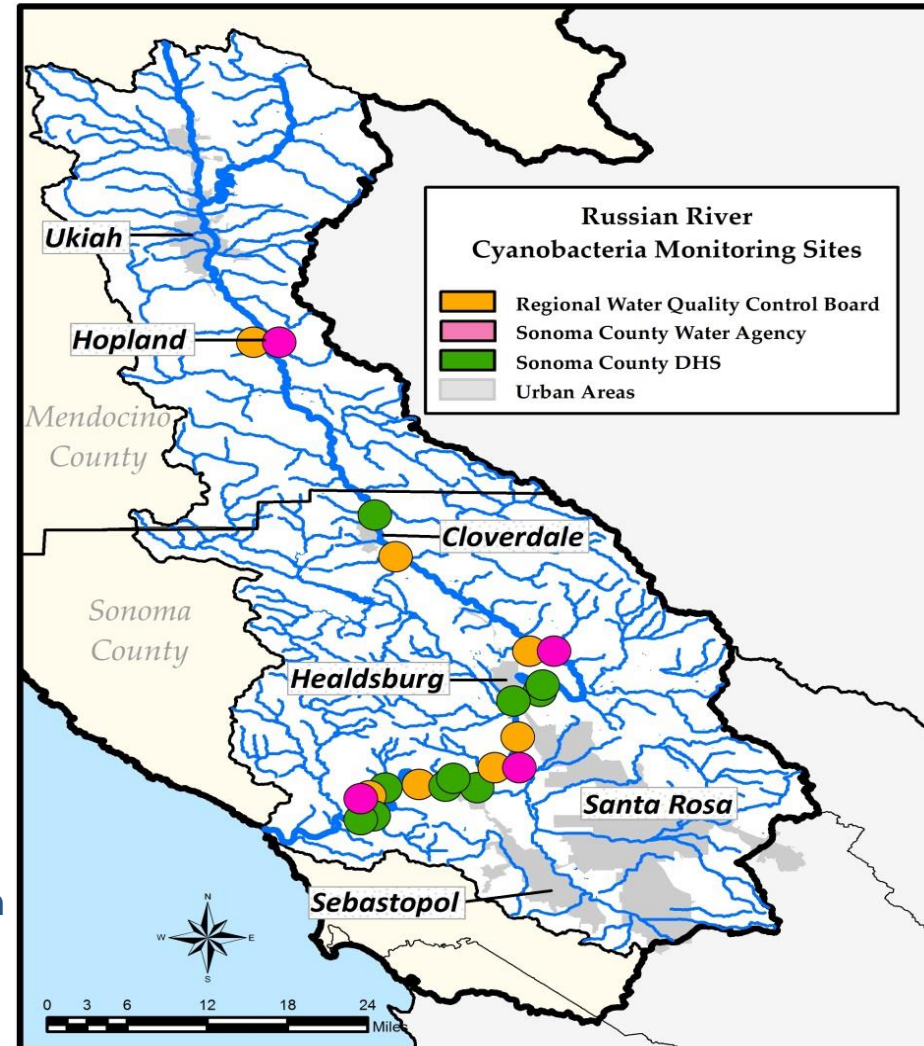
Pilot Program for 2016 & 2017

1. Public health monitoring

- ✓ **Weekly Toxin Monitoring at 10 beaches**
 - Sonoma County Department of Health Services

2. Improve understanding of algae and cyanobacteria dynamics

- ✓ **Weekly Ambient Water Quality Data Summary & Bi-weekly Algae/Cyanobacteria Monitoring**
 - Sonoma County Water Agency
- ✓ **Bi-weekly Ambient Toxin Monitoring**
North Coast Regional Water Board
- ✓ **Visual Monitoring**
 - Russian Riverkeeper / Business Owners on the River / Sonoma County Parks



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2016 Regional Water Board Data Example

Russian River between Healdsburg & Riverfront Park

- **Toxins present June – October** (sampling conducted mid-June – early October 2016)
- **3 sample methods = 3 different pictures of toxin conditions**
- **High concentrations of anatoxin-a in algae; non-detects in water; microcystin detected in SPATTS**

Samples collected 9/11 (SPATT 8/29-9/11)	Microcystin (Liver Toxin)	Anatoxin (Neurotoxin)
Water Grab	ND	ND
Algae Grab	0.45 ug/L	>15,750 ug/L
SPATT	3.474 ng toxin / g resin	ND

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Solid Phase Adsorption Toxin Tracking (SPATT)

Algae Grab

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>15,750 ug/L

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Cyanobacteria & Cyanotoxin Field Screening Tools

Cyanoscope



FluoroSense™ Handheld Fluorometer

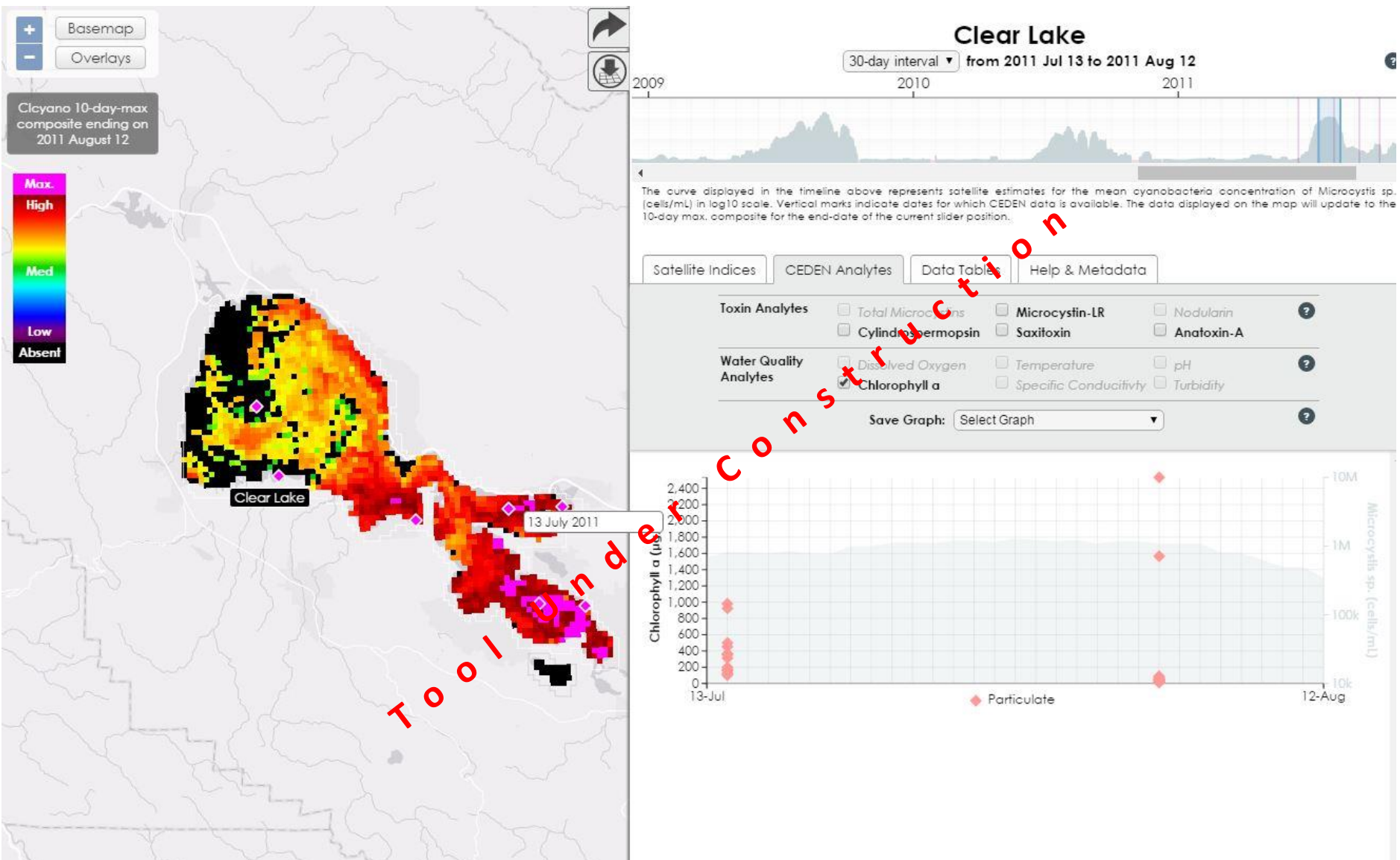


Toxin Test Strips



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Satellite Imagery for Early Bloom Detection



Thank You

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